

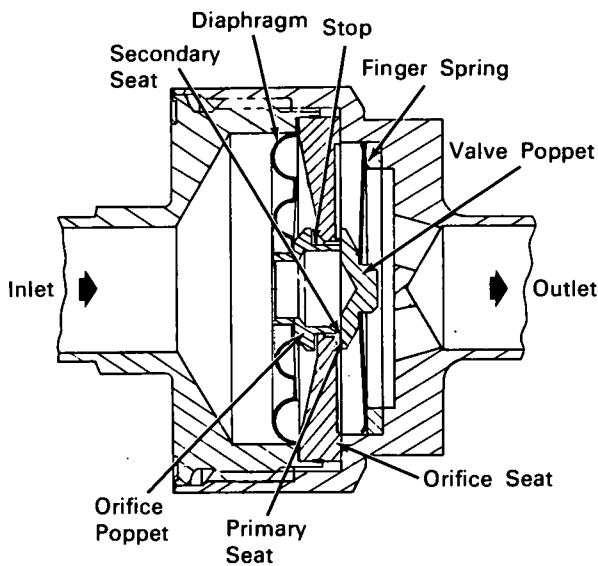
NASA TECH BRIEF



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Division, NASA, Code UT, Washington, D.C. 20546.

Low Leak Rate Poppet-and-Seat Check Valve

Valve leakage due to contaminant entrapment and chattering has been effectively minimized by a metallic poppet-and-seat check valve designed for use in extreme environmental and fluid temperature conditions. Operation under these conditions normally requires that the opening distance of the valve be very small. Under certain resonant conditions, this mode of operation may cause the valve to chatter, which



Longitudinal Section of Valve

in turn causes erratic operation of the valve and excessive wear on the valve sealing surfaces. The small opening distance also contributes to contaminants being trapped between the sealing surfaces, preventing the valve from closing completely. Both characteristics contribute to valve leakage which may be unacceptable for the particular application.

Two design features of the poppet-and-seat check valve (see fig.) eliminate these problems. First, contaminant entrapment problems are minimized by the double seat and poppet configuration which permits an opening arrangement that can tolerate contamination of a certain particle size without degradation of the valve sealing capability. The arrangement consists of the primary sealing point between the fixed orifice seat and the valve poppet, and the secondary sealing point between the orifice poppet and the valve poppet. Upstream of the valve orifice is a flexible convoluted metal diaphragm attached to the orifice poppet. This feature permits movement of the secondary seat and acts as a seal to prevent gas flow except through the central hole in the secondary seat.

Second, downstream of the valve orifice is the finger spring which exerts a force against the valve poppet, tending to keep the valve in a closed position. This finger spring is used to minimize chatter. It has a low mass and a natural frequency above the range which causes chatter of the poppet. Should chatter occur, the double seat configuration makes it possible for all excessive wear to take place on one sealing interface with little wear or damage to the other sealing interface.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Manned Spacecraft Center, Code BM7
Houston, Texas 77058
Reference: TSP70-10688

(continued overleaf)

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to:

Patent Counsel
Mail Code AM
Manned Spacecraft Center
Houston, Texas 77058

Source: David E. Whitten of
Bendix Corp.
under contract to
Manned Spacecraft Center
(MSC-13587)